

# HOW TO GROW THE CITY?

**WINDFARM**  
Following the European Union's directive, Poland is required to reduce its CO<sub>2</sub> emissions by 21 million tons by the year 2020.

The Shipyard in Gdynia was one of the most productive and important parts of the city but unfortunately in 2008 workshop was closed. During 90 years the Shipyard built 600 ships with carrying capacity of over 8 000 000 tons. Sadly, today instead of industrial tunes which were part of the city's symphony, we can only hear a tranquil melody played by the wind on hooks. Over 5000 workers lost their jobs. Nowadays over the city "manless" (jobless) cranes are looming just waiting for a signal to start work.

The program attempts to bring Gdynia's shipyard back to live while utilising deep understanding of its industrial potential, economic condition and social aspects (all of which are tightly related to this extraordinary place). The Workshop will be used not only to manufacture wind turbines but also to make the buildings elements of a new district spreading over the post-industrial area.

The geometry of module (cell) gives opportunity to create a variety arrangements, what allows users design different types of spaces and further adapting them according to their lifestyle. This modular system gives flexibility in the creation of function.

By Giving the potential to build, connect, service, move, grow and change easily the building structure elements, we receive fantastic future metabolic chances. This kind of buildings can be still alive even after finishing the design process, and evaluated during the time.

To provide a natural and proper development of the structure, the project proposes a system of self-organization. In theory all of this establishments sound promising but to find out if this building generation is possible, potential users were invited to take part in activity entitled "how to grow the city?". The aim of this event was the building creation, accordingly to the self-organization rules and individual needs of inhabitants.

The results were really astonishing and even surprising. The participants received adaptable structures reflecting their desires and determined by the context of Gdynia's harbour. The available infrastructure like: old track ways and cranes were used as tools to transport and build an object.

Building is surrounded by greenery to improve life condition and create shelters for animals. Including users in designing process was aimed at causing their identification with this part of the city, as well as reviving their community awareness.

Next step of the project was to analyse the structure future behaviour. The Function, the age of the users and their preferences – these are factors which have to be taken under consideration as they will have the strongest impact on the object. Depending on the configuration of these components the structure will have a unique, adjusted shape and scale. Sometimes the factors setup can make a building look highly defragmented to provide diversity of space and proper lightening in each module. Some other time, the object will spread and thicken its structure.

The most fascinating aspect of the project is that any scenario is possible as while time architecture will adjust to local environment changes (economic crisis, users' expectations or the need of fast growth). The proposed design allows this structure to go hand in hand with the on-going EVOLUTION of this part of Gdynia.

THE DISTRICT WILL GROW AND SPREAD OVER UNUSED POST-INDUSTRIAL ZONE IN THE NEIGHBOURHOOD OF THE ABANDONED SHIPYARD. IN TIME ALONG WITH THE CITY'S DEVELOPMENT THIS STRUCTURE IS GOING TO CONURBATE THE SURROUNDING AVAILABLE AREA...

KARLSKRONA  
HELFINA  
ROSTOCK

125 m  
250 m  
500 m  
1000 m

RELATIONS  
ECONOMIC PROFITS  
ECOLOGICAL PROFITS

## ADAPTABLE FUTURES

### MODULARITY

### SYSTEM OF SELF-ORGANIZATION

### GEOMETRY

I WAS LOOKING FOR A WAY TO REDUCE THE COST OF PRODUCTION AND TO SIMPLIFY THE STRUCTURE SYSTEM. THE INSPIRATION CAME FROM INCREDIBLY EFFICIENT MULTI-CELLULAR ORGANISMS. THEY DEVELOPED THE ABILITY TO GROW FAST, DIVIDE THEMSELVES, MODIFY AND MOST IMPORTANTLY ADAPT TO CHANGING CONDITIONS. THE SHAPE OF AN INDIVIDUAL MODULE ALLOWS TO CREATE A VARIETY OF STRUCTURE ARRANGEMENTS.

SHAPE  
b=4707a, a=98,420° γ=81,580°  
a = 6700 mm

SCHEME EXPLAINS GENERATION OF OPENINGS

### CONSTRUCTION

EACH MODULE IS DIVIDED INTO TWO LAYERS. THE EXTERNAL CONSISTS OF LIGHT PANELS PROTECTING THE INTERIOR FROM WEATHER CHANGES. THE INTERNAL IS MADE UP OF MOBILE CURTAINS WHICH CAN BE USED AS WALLS, DOORS OR AS ELEMENTS OF FURNITURE. THE FLOOR AND CEILING LEVELS CAN ALSO BE ADJUSTED TO THE SPACE REQUIREMENTS SUCH AS STORAGE, INSTALLATIONS AND INTERIOR DIVISION. THE KIT-OF-PARTS CONSTRUCTION CONSISTS OF STEEL FRAME AND THE ELEMENTS, THE SIZE OF WHICH ALLOWS TO TRANSPORT THEM EASILY. ALL CONVERTIBLE ELEMENTS WERE OPTIMIZED TO ACHIEVE LOWEST POSSIBLE CARBON FOOTPRINT DURING PRODUCTION AND BUILDINGS' ASSEMBLY.

- THE STEEL ROOF
- TOP TRAPEZOIDAL SHEET
- MODULAR WOODEN DROPPED CEILING
- WOODEN CURTAINS
- TOP EXTERIOR PANELS
- TOP STEEL FRAME
- OPENINGS TO CONNECT MODULES EASILY
- STEEL COLUMNS
- PERFORATED PANELS
- WINDOW MODULE
- INSULATION
- EXTERIOR PANELS
- STORAGE SYSTEM IN THE FLOOR
- BOTTOM TRAPEZOIDAL SHEET
- STEEL FLOOR CONSTRUCTION
- BOTTOM STEEL COVER

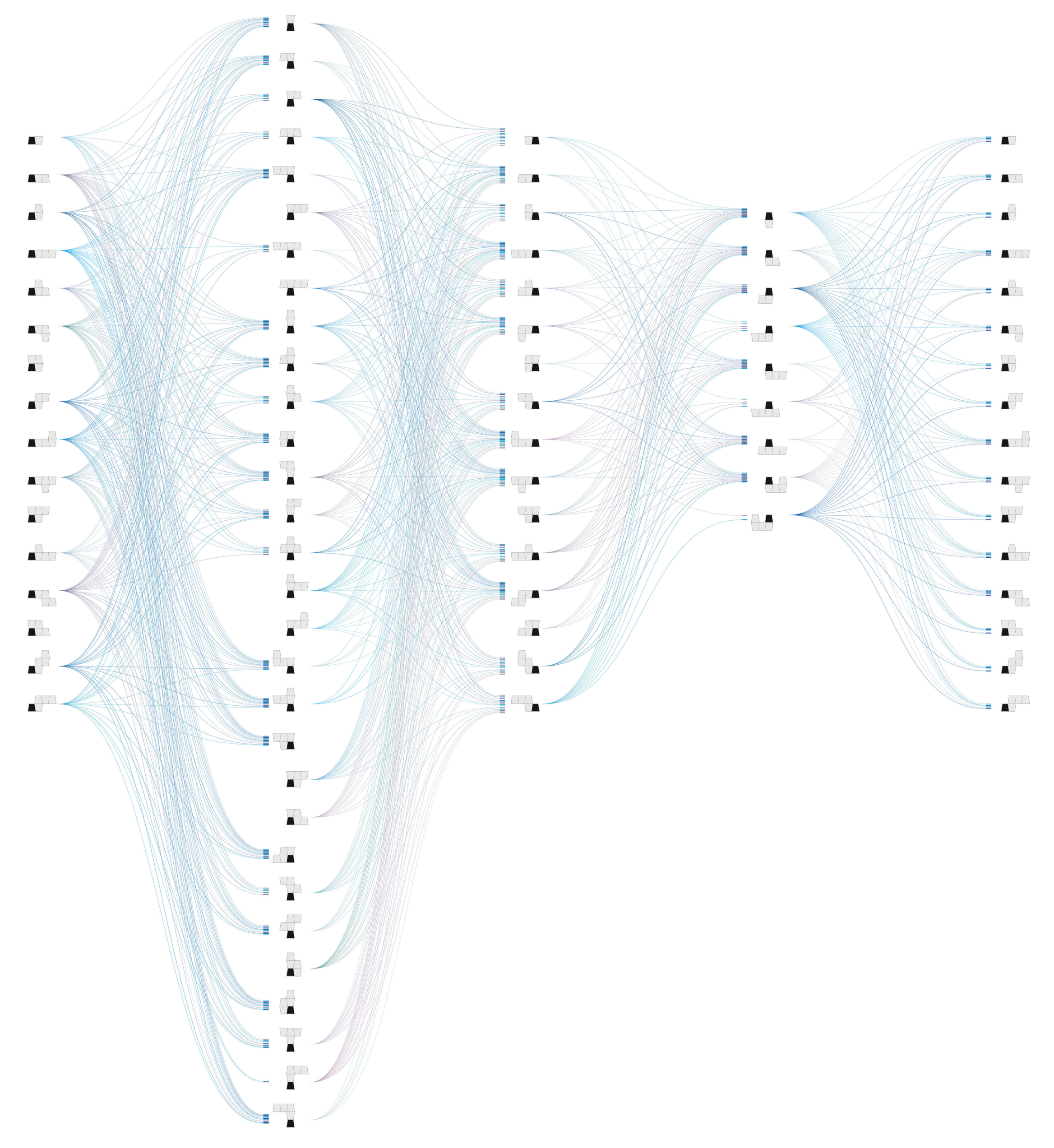
### LAYERS ARRANGEMENT

BY USING THIS ADJUSTABLE ELEMENTS AND CHANGING THEIR POSITION, USERS CAN EASILY CREATE DIFFERENT TYPES OF SPACE ADAPTING IT ACCORDING TO THEIR LIFESTYLE AND ACTIVITY. EACH ROOM CAN BE MULTIFUNCTIONAL. THIS MODULAR SYSTEM GIVES FLEXIBILITY IN THE CREATION OF FUNCTION. ONE MODULE HAS 33 M<sup>2</sup> WHICH ALLOWS TO CREATE A SMALL STUDIO INSIDE IT. THE SAME MODULE, DUPLICATED, CAN BE USED AS A COTTAGE, AN OFFICE, STORAGE SPACE OR KINDERGARTEN (DEPENDING ON USER'S NEEDS).

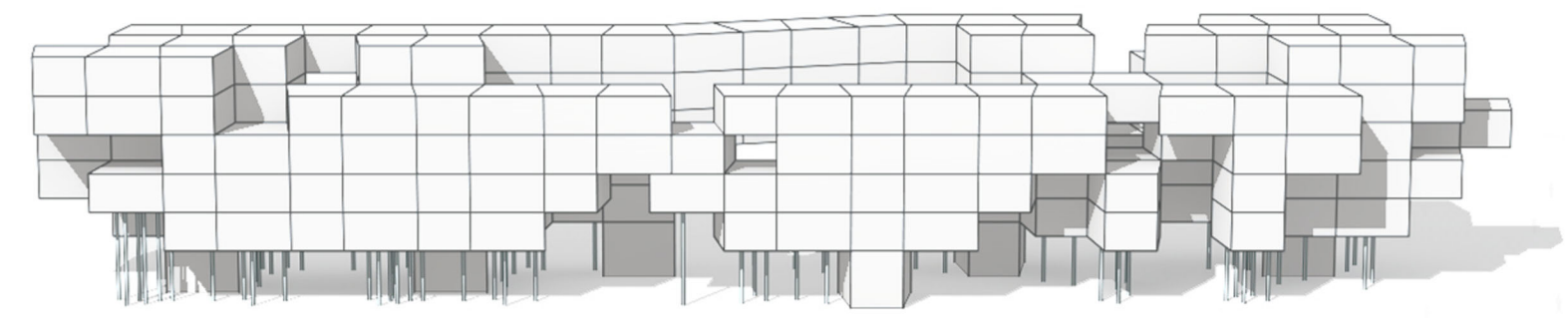
THE SYSTEM OF SELF-ORGANISATION PROVIDES PROPER GROWTH OF STRUCTURE. SIMPLE RULES DESCRIBE THE BEHAVIOUR OF A MODULE AND ITS RELATION WITH ITS NEIGHBOURS. MAIN RULES USED TO CREATE A MULTIFAMILY HOUSE ARE:

EACH ADDED MODULE AS WELL AS THE ALREADY EXISTING ONES HAVE TO HAVE AT LEAST ONE FREE WALL – PROVIDING ACCESS OF NATURAL LIGHTING.

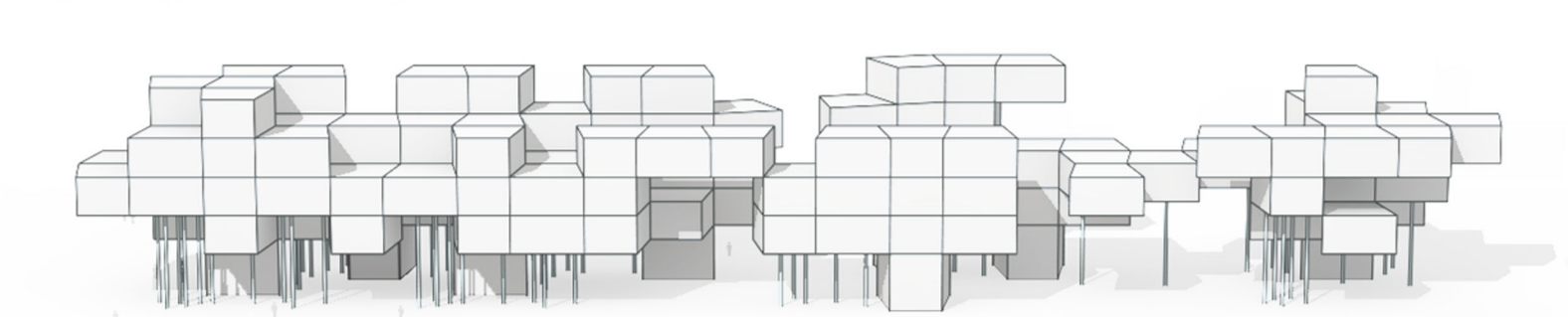
IF ONE FUNCTIONAL BLOCK TAKES MORE THAN 3 MODULES THEN AT LEAST ONE MODULE IN THIS UNIT HAS TO HAVE AT LEAST 2 FREE WALLS – EFFICIENT VENTILATION.



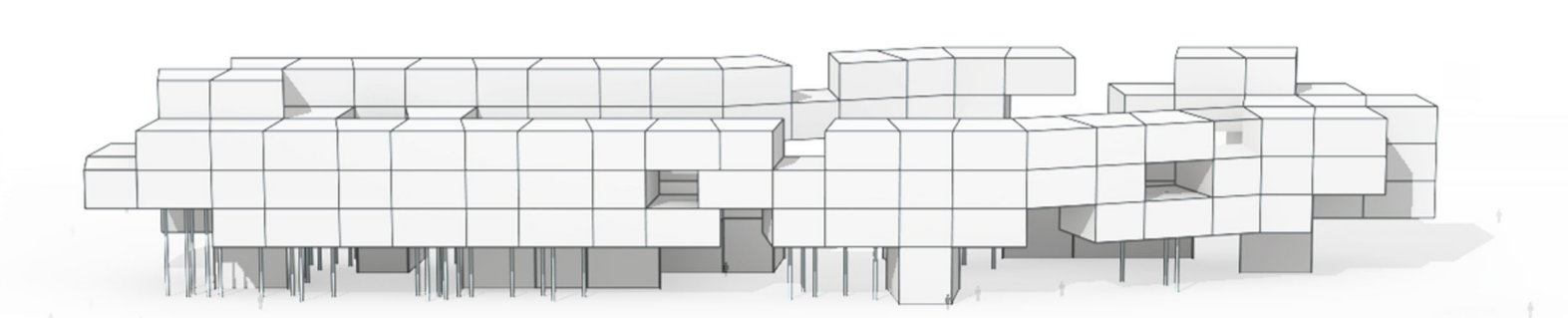




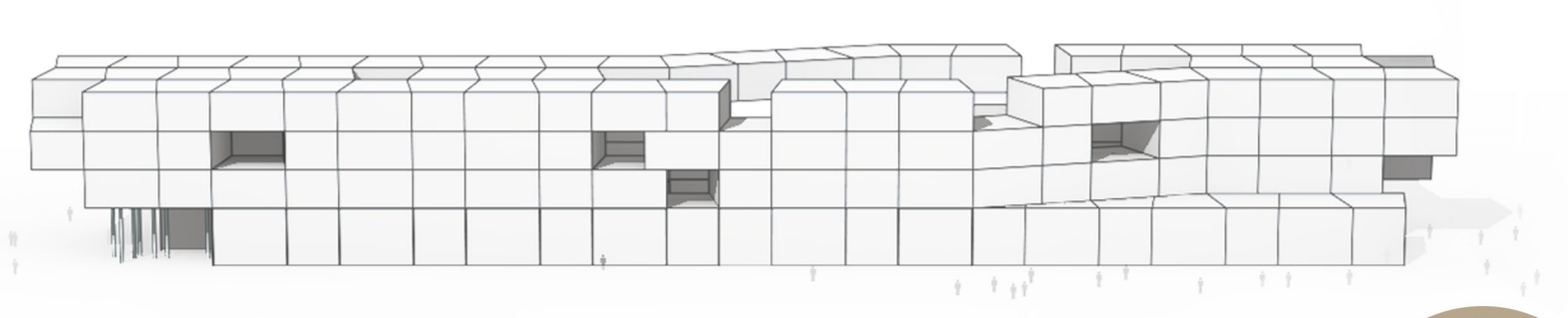
RECEIVED STRUCTURE, CREATED BY POTENTIAL USERS. THE INVITED GROUP REPRESENTED AVERAGE CURRENT SOCIETY



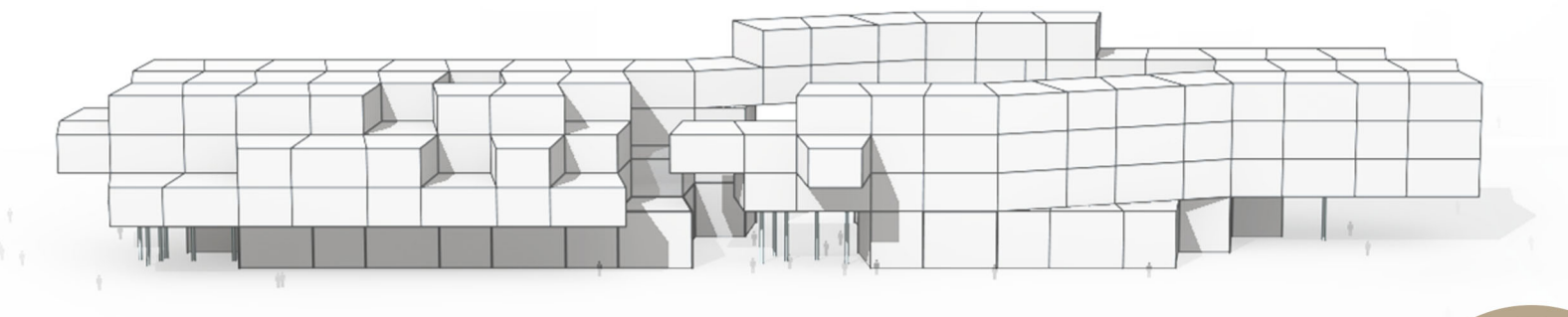
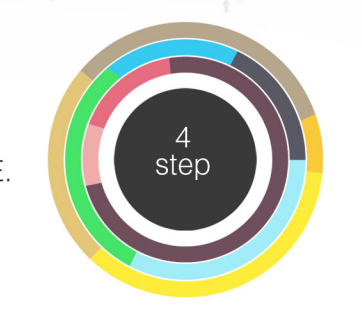
DURING THE TIME SOCIETY IS BECOMING OLDER, AMOUNT OF MODULES AND BUILDING LEVELS ARE DECREASING



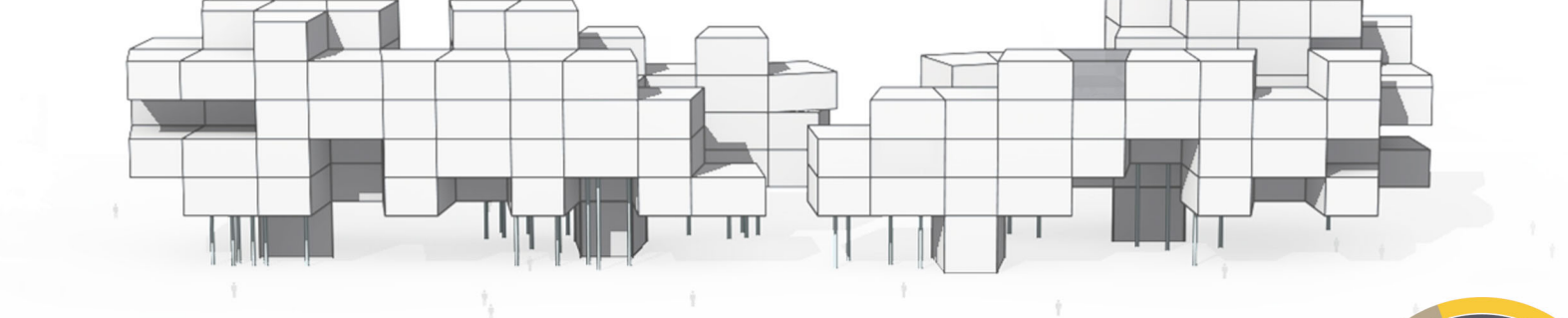
INCREASING PERCENTAGE OF SHOPS IN STRUCTURE. ONE OF THE MOST IMPORTANT FACTOR DETERMINING SHAPE IS ECONOMY.



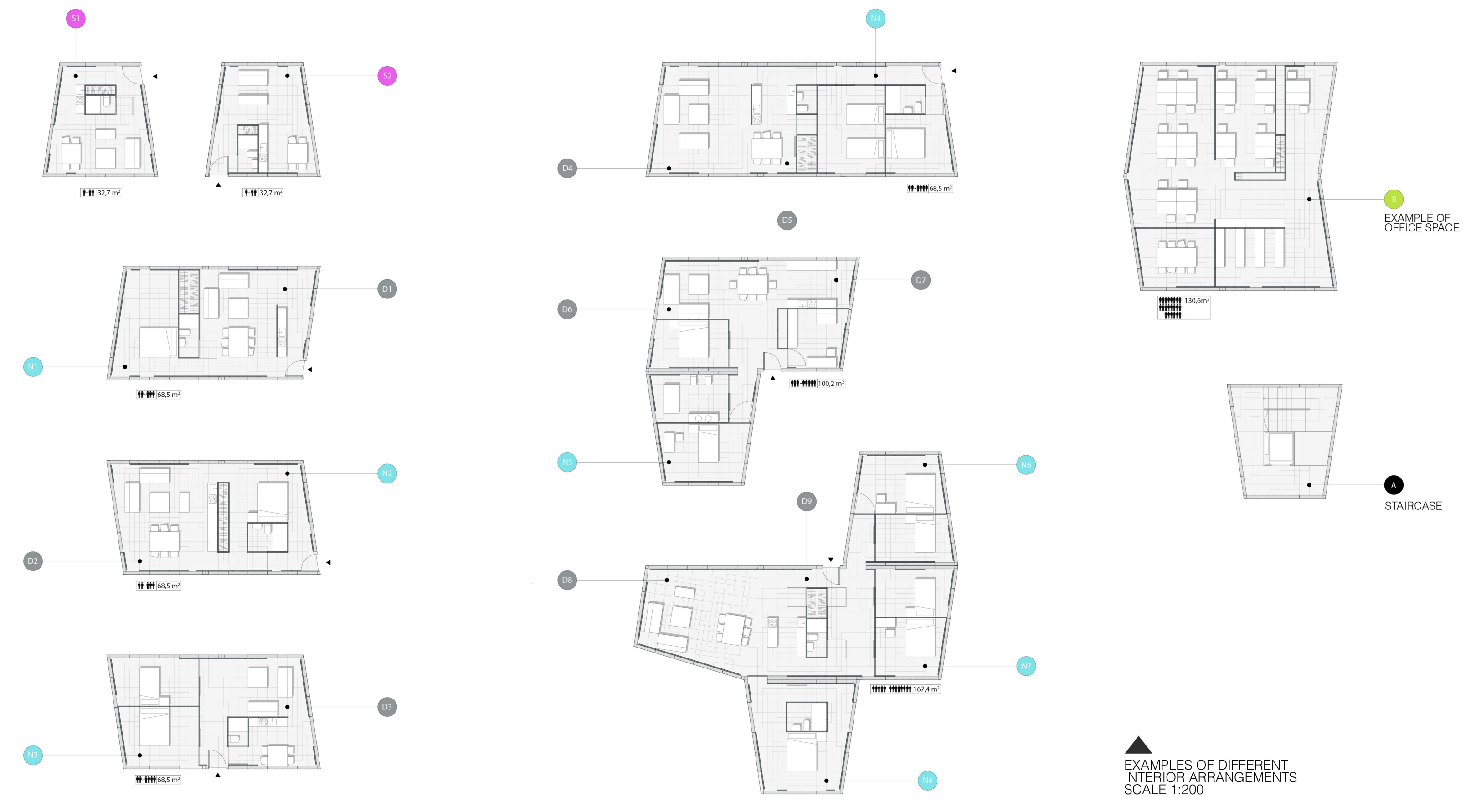
CULTURE - REQUIRES A LOT OF SPACE.



EDUCATION - THE MOST COMMON USERS ARE YOUNGSTER AND PEOPLE IN MIDDLE AGE

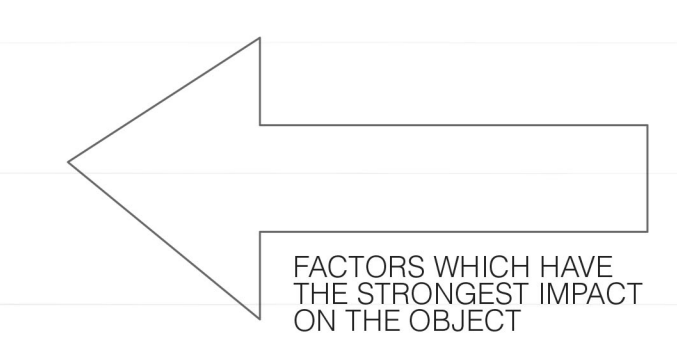


ONE OF THE MOST PROBABLE FUTURE FUNCTION ARE OFFICES



EXAMPLES OF DIFFERENT INTERIOR ARRANGEMENTS SCALE 1:200

FUTURE USERS (FAMILIES, GROUP OF FRIENDS, STUDENTS) WERE INVITED TO TAKE PART IN EVENT TO CREATE LIVING STRUCTURE. EVERYONE KNEW CONTEXT, CARDINAL DIRECTION AND MAXIMUM SIZE OF BUILDING. REST WAS OPEN TO THEIR CREATIVITY. THE MODEL IS DYNAMIC STRUCTURE REFLECTING THE REQUIREMENTS OF ITS INHABITANTS.



FACTORS WHICH HAVE THE STRONGEST IMPACT ON THE OBJECT



- THE FUNCTION
  - EDUCATION
  - COMMERCIAL
  - ENTERTAINMENT
  - BUSINESS
  - HOUSING
  - CULTURE
- THE AGE
  - 0-22
  - 23-42
  - 43-62
  - 63-
- THE PREFERENCES
  - SIZE OF THE SPACE
  - ACCESS TO DAYLIGHT
  - SUSTAINABILITY
  - ECONOMY



GREENERY BETWEEN ARCHITECTURE



ONE ROOM ARRANGEMENTS DURING THE DAY



FARMS AND PUBLIC SPACES BELOW THE CONSTRUCTION